

PHEMERANTHUS CALCARICUS (MONTIACEAE) NEW TO TEXAS

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ABSTRACT

Phemeranthus calcaricus is reported here as new to Texas. It was discovered in a limestone glade in Parker County, north of Weatherford, in a habitat similar to that in which it is found in Alabama, Kentucky, and Tennessee.

RESUMEN

Se cita aquí *Phemeranthus calcaricus* como nueva para Texas. Se descubrió en un claro de caliza en el condado de Parker County, al norte de Weatherford, en un hábitat similar al que se encuentra en Alabama, Kentucky, y Tennessee.

Phemeranthus calcaricus (Ware) Kiger (*Talinum calcaricum* Ware), limestone fameflower, is not listed by Diggs et al. (1999), but is present in Texas based on the key from the *Flora of North America* (Kiger 2004). *Phemeranthus calcaricus* was collected in Parker County, Texas, 10.2 km north and 3.3 km east of the Parker County Courthouse in Weatherford, in July of 2010 and May and September of 2011. *Phemeranthus calcaricus* is similar to *P. calycinus* (Engelm.) Kiger, which also occurs in north central Texas (Kiger 2004). Smaller sepal and petal size distinguish *P. calcaricus* (Fig. 1) from *P. calycinus* (Kiger 2004; Murdy & Carter 2001; Ware 1967). A summary of other distinguishing characteristics is provided for both species (Table 1).

According to Murdy and Carter (2001), based on chromosome number, *Phemeranthus calcaricus* may actually be an autotetraploid derivative of *P. calycinus*. *Phemeranthus calcaricus* has 24 pairs of chromosomes, whereas chromosome numbers of *P. calycinus* populations are either $n = 12$ or $n = 24$. *Phemeranthus calcaricus* and *P. calycinus* can hybridize and produce fertile offspring (Murdy & Carter 2001), but this should not be the case here due to lack of populations in the area of *P. calycinus*.

Phemeranthus calycinus is found in Southern Great Plains and Southern to South Central Plains regions. Specifically it is found from north central Nebraska, northeastern Colorado, and eastern New Mexico eastward to southwest Illinois, northeastern Arkansas, and north central Texas. *Phemeranthus calcaricus* is endemic to the Interior Low Plateaus physiographic province. Within this region, it is most abundant in the Nashville Basin of central Tennessee, the Moulton Valley of northern Alabama, and the Highland Rim of south-central Kentucky (Baskin & Baskin 2003; Kartesz 2011). Both species are found in similar habitats in glade-like open rocky soils, frequently associated with outcrops (Kiger 2004).

Phemeranthus calcaricus was previously thought to be endemic to limestone cedar glades of Tennessee, Alabama, and Kentucky; only one collection exists west of the Mississippi River from a glade in Arkansas [Izard Co.: ca. 4 mi W of Calico Rock, Limestone glades, 30 May 1976 B.L. Lipscomb 1577, NCU] This specimen was cited by Kiger (2004) but was not mapped by Kartesz (2011).

During field work for the "Vascular flora of the north central Texas Walnut Formation" (Swadek 2012), a population of *Phemeranthus calcaricus* was found on private property in Parker County, Texas, on a dry Walnut Limestone glade in full sun with thin, shallow, gravely clay loam entisols of the Maloterre Series (Greenwade et al. 1977; McGowen et al. 1987). Thus the geographical distribution of *P. calcaricus* now extends west into Texas (Fig. 2).

Herbarium specimens of *Phemeranthus* lose valuable taxonomic characters, e.g. petal size and color, fruit shape and size, and anther and style characteristics, as a result of pressing and drying (Holzinger 1900; Ware



FIG. 1. *Phemeranthus calcaricus* in Walnut Glade north of Weatherford, Parker Texas, 18 May 2011, Rebecca K. Swadek.

TABLE 1. Distinguishing characteristics of *Phemeranthus calycinus* and *P. calcaricus* (Kiger 2004; Murdy & Carter 2001; Ware 1967).

Character	<i>Phemeranthus calycinus</i>	<i>Phemeranthus calcaricus</i>
Height	to 40 cm	to 25 cm
Roots	fleshy, woody	fleshy, tuberous
Inflorescence	cymose	cymose
Leaves	sessile, subterete	sessile, terete
Sepals	4–6 mm	3–4 mm
Petals	10–15 mm	8–10 mm
Stamens	25–45	25–45
Stigma	1	1
Capsules	6–7 mm	4–6 mm
Habitat	Limestone outcrops	Rocky to sandy soils, frequently on or near outcrops

1967). Living specimens were also examined in the field to determine morphological characteristics. Additionally, some plants were transplanted to pots and shallow saucers in a backyard, with similar climate, and differing soil mediums (native, half native and half commercial medium). Transplants received only rainwater and were observed over the course of two years in order to further evaluate the morphological variation. Though this was not a thorough study, it should still be noted that soil medium does have some affect on phenotypic plasticity—plants grow taller and flower earlier in a partly commercial medium than those in native soil, but there is no difference in sepal size. This slight plasticity may be why these two species are so difficult to differentiate and this matter probably deserves further study. Other specimens in the BRIT-SMU-VDB herbarium due key to *Phemeranthus calcaricus* from *P. calycinus*, but due to the difficulties in identifying the species following pressing and drying, and differing habitats and soil mediums, the identity of those specimens is still left to speculation.

Voucher specimens: **U.S.A. TEXAS. Parker Co.:** Walnut Limestone glade at Utley Prairie, shallow gravelly clay loam weathered from limestone of the Maloterre Series, ca. 7 mi N of Weatherford, W of FM 51 at ca. 5130 Weiland Road, 32.8664 N, -97.7614 W, 14 Jul 2010, R.K. Swadek 387 (BRIT); 18 May 2011, R.K. Swadek 625 (BRIT); Walnut Limestone glade at Utley Prairie, shallow gravelly clay loam weathered from limestone of the Maloterre Series, ca. 7 mi N of Weatherford, W of FM 51 at ca. 5130 Weiland Road, 32.85091 N, -97.76230 W, 28 Sep 2011, R.K. Swadek 746 (BRIT).

Glades of the Walnut Limestone geological formation are open expanses of rock surrounded by shallow soiled barrens and limestone scrub woodlands. Though the habitat is structurally similar to limestone cedar glades of the southeastern United States, those of the north central Texas differ in that *Juniperus virginiana* L. is not dominant. The population of *Phemeranthus calcaricus* found in North Central Texas is associated with *Dalea reverchonii* (S. Wats) Shinnery (a north central Texas limestone glade endemic), *Minuartia michauxii* var. *texana* (B.L. Rob.) Mattf., *Sedum nuttallianum* Raf., and a cyanobacterium, *Nostoc commune*. Nearby in adjacent barrens—often called xeric limestone prairies, which are slightly deeper soiled and frequently slightly sloping—the dominant vegetation includes *Opuntia phaeacantha* Engelm., *Yucca pallida* McKelvey as well as various perennial bunch grasses such as *Aristida purpurea* Nutt. var. *nealleyi* (Vasey) Allred, *Schizachyrium scoparium* (Michx.) Nash, and *Tridens muticus* (Torr.) Nash. The scrub woodlands adjacent to these glades and barrens are dominated by *Celtis laevigata* Willd., *Forestiera pubescens* Nutt., *Quercus* spp. (*Q. buckleyi* Nixon & Dorr, *Q. fusiformis* Small, or *Q. sinuata* Walter var. *breviloba* (Torr.) C.H. Mull.), and *Rhus trilobata* Nutt. This description is very similar to a community described by Quarterman (1950) with *Celtis laevigata*, *Forestiera ligustrina* (Michx.) Poir., *Petalostemum gattengeri* (now *Dalea*), *Rhus aromatica* Aiton, *Sedum pulchellum* Michx., and *Talinum teretifolium* Pursh (now possibly *Phemeranthus calcaricus*, as it was not described until 1967), on a limestone glade in Tennessee.

Gratiola quartermaniae D. Estes and Small, previously reported from central Texas in Bell, Llano, and Williamson counties and eastern limestone cedar glades (Estes & Small 2007) was also discovered on Walnut Glade seeps in north central Texas (Taylor & O'Kennon, in prep.). Though approximately 1,200 km apart, Walnut Limestone glades and Southeastern limestone cedar glades have remarkably similar structural and

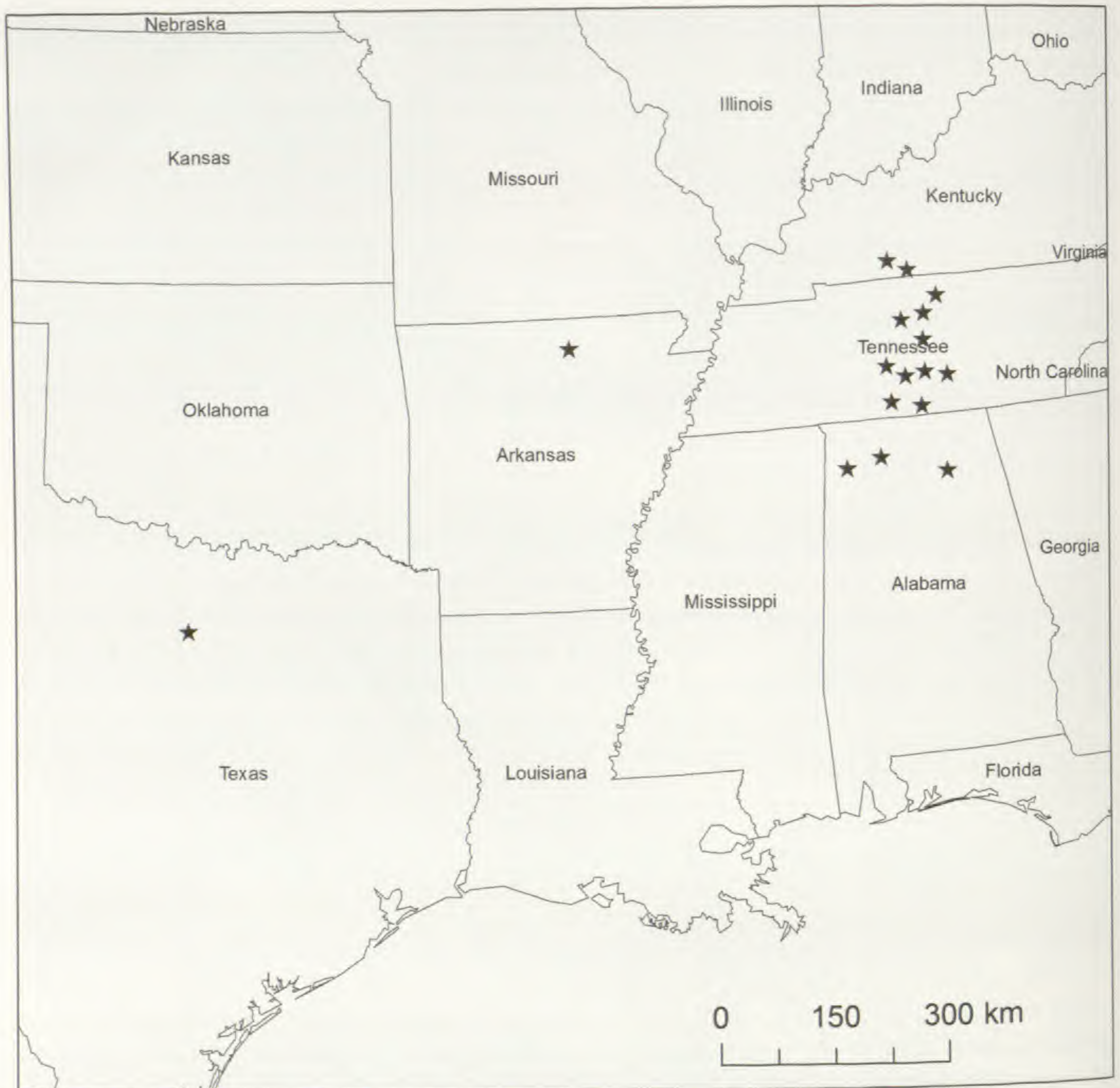


FIG. 2. Known geographic distribution of *Phemeranthus calcaricus* in North America.

floristic qualities. Some species common to both glade systems include *Croton monanthogynus* Michx., *Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark, *Gratiola quartermaniae*, *Hedyotis nigricans* (Lam.) Fosberg, *Heliotropium tenellum* (Nutt.) Torr., *Isoetes butleri* Engelm., *Nostoc commune*, *Nothoscordum bivalve* (L.) Britton, *Oenothera macrocarpa* Nutt., and *Sporobolus vaginiflorus* (Torr. ex A. Gray) Alph. Wood.

Many species found in Walnut Glades are related to those of Eastern Limestone Cedar Glades. These species live in similar habitats, likely fill the same ecological niches, and have evolved similar traits. Related species include *Dalea gattengeri* (A. Heller) Barneby on cedar glades versus *D. reverchonii* and *D. tenuis* (J.M. Coult.) Shinnars on the Walnut Formation, *Eleocharis bifida* S.G. Sm. versus *E. occulta* S.G. Sm. and *E. montevidensis* Kunth, *Minuartia patula* (Michx.) Mattf. versus *M. michauxii* var. *texana*, *Opuntia caespitosa* Raf., formerly thought to be *O. humifusa* (Raf.) Raf. (Majure et al. 2012), versus *O. phaeacantha*, and *Sedum pulchellum* versus *S. nuttallianum* (Baskin & Baskin 2003; Jones 2005; Norton 2010; Quarterman 1950).

Images of the voucher specimens are available at BRIT's online digital herbarium, Atrium (atrium.brit.org) or <http://atrium.brit.org/search.php?q=phemeranthus&x=0&y=0&query=all>.

ACKNOWLEDGMENTS

I would like to thank David Utley for allowing me to collect on his property for the last several years. I would also like to thank Barney Lipscomb for his encouragement, and Amanda Neill, Art Busbey, and Tony Burgess for their reviews and support during the course of my master's thesis.

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